

Vorlesungsverzeichnis

English-taught courses of the Faculty

Sommer 2021

Stand 16.09.2021

English-taught courses of the Faculty	3
Bachelor	3
Master	15

English-taught courses of the Faculty

Bachelor

419140048 Einführung in die Moderne Kryptographie

S. Lucks, N. Lang

Veranst. SWS: 3

Vorlesung

Mo, wöch., 11:00 - 12:30, Vorlesung (online) Moodle-Link: <https://moodle.uni-weimar.de/enrol/index.php?id=31813>, ab 12.04.2021

Di, wöch., 15:15 - 16:45, Übung (online), ab 13.04.2021

Di, Einzel, 13:30 - 15:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Q&A-Session, 21.09.2021 - 21.09.2021

Do, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal C, schriftl. Prüfung, 30.09.2021 - 30.09.2021

Beschreibung

Früher galt die Kryptographie als Werkzeug für Militärs, Geheimdienste und Diplomaten. Aus dieser Zeit stammt auch noch die berühmte Enigma-Chiffriermaschine.

Heute entwickelt sich die Kryptographie buchstäblich zu einer Schlüsseltechnologie für sichere Kommunikation und Mediennutzung. Von der Öffentlichkeit kaum bemerkt hat die Kryptographie schon längst Einzug gehalten in alltäglich genutzte Geräte wie Geldautomaten und Mobiltelefone.

Der Entwurf kryptographischer Komponenten ist schwierig, und in der Praxis trifft man oft auf erhebliche Entwurfsfehler. (Dies kommentiert der IT-Sicherheitsexperte Bruce Schneier mit drastischen Worten: "Milliarden von Dollar werden für Computersicherheit ausgegeben, und das Meiste davon wird für unsichere Produkte verschwendet.")

Nicht nur der Entwurf kryptographischer Komponenten ist schwierig, auch der Einsatz von "an sich guten" Komponenten für sichere IT-systeme ist fehlerträchtig und erfordert ein genaues Verständnis der jeweiligen Bedingungen, unter denen eine kryptographische Komponente als "sicher" gelten kann.

Die Vorlesung gibt einen Einblick in Denkweise und Methodik der Mediensicherheit und der modernen Kryptographie und die Anwendung der Kryptographie, um Sicherheitsprobleme zu lösen.

Bemerkung

Vorlesung und Übung englisch, aber deutschsprachiges Tutorium für Bachelor-Studierende

Voraussetzungen

Diskrete Strukturen

Leistungsnachweis

schriftliche Klausur

421110000 Applied Deep Learning for Computer Vision

V. Rodehorst, J. Eick, D. Tschirschwitz

Projekt

Beschreibung

During this practice-oriented Deep Learning project, we will implement current state-of-the-art models for solving difficult tasks in the field of computer vision. During the course of the project the participants will learn how to implement and adapt models for image classification, segmentation, etc to varying problem domains. The landscape of data driven approaches is rapidly changing and researchers need a good understanding of the required tools, publicly available datasets and methods. The students will learn the design and evaluation of existing models, and how to leverage these skills to adapt and implement own models.

Bemerkung

Mandatory technology stack (no other framework allowed):

- Python
- PyTorch

Voraussetzungen

Successful completion of the course "Image Analysis and Object Recognition"

Good programming skills in Python

Leistungsnachweis

Active participation, presentations and project documentation (e.g. commented repositories)

421110003 FL BaSe – Formal-Language Based Security**S. Lucks, J. Boßert, N. Lang**

Veranst. SWS: 10

Projekt

Beschreibung

Wenn binäre Daten als Byte-Strom verschickt werden, braucht man eine „Datenserialisierungssprache“ (DSL). Im Unterschied zu menschenlesbaren Sprachen gibt es viele DSLs, die Daten variabler Länge als Längenpräfix-Sprachen implementieren. Das Ziel des Projektes besteht darin, eine Erweiterung der EBNF (der „extended Backus-Naur Form“) einzuführen, und einen Prototyp für einen Parser- Generator für derartige Sprachen zu implementieren.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Discrete Mathematics
Formal Languages
Solid programming skills

Leistungsnachweis

Zwischenpräsentation, Abschlusspräsentation, Abschlussbericht

421110004 Gamifizierung von Lerninhalten

C. Wüthrich, G. Pandolfo
Projekt

Veranst. SWS: 10

Bemerkung

time and place: t.b.a.

421110005 Hot Topics in Computer Vision SoSe21

V. Rodehorst, C. Benz, P. Debus, M. Kaisheva
Projekt

Beschreibung

Die Teilnehmer werden an ein aktuelles forschungs- oder industrierelevantes Thema herangeführt. Es ist nicht beabsichtigt einen festgelegten Bereich in voller Breite zu explorieren. Stattdessen werden die Teilnehmer mit der vollen Komplexität eines begrenzten Themas konfrontiert und die Eigeninitiative gefördert. Es ermöglicht einen Einblick in die Forschungs- und Entwicklungsprojekte des Fachgebiets.

Bemerkung

Ort und Zeit werden zur Projektbörse bekanntgegeben.

Voraussetzungen

Gute Programmierkenntnisse (z.B. C/C++, MATLAB, OpenCL)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

421110006 Human echolocation in video games for the blind

J. Ehlers
Projekt

Veranst. SWS: 10

Bemerkung

time and place: t.b.a.

421110007 Large-Scale Concept Mining in Scientific Publications

B. Stein, J. Bevendorff, T. Gollub, N. Kolyada, M. Wolska
Projekt

Veranst. SWS: 10

Beschreibung

Scientific publications can be regarded as contributions to a complex asynchronous and multi-threaded conversation about specific research questions. Scientists develop and describe their own ideas and relate them to and compare them with previous related ideas and concepts in the field. In this project, you will learn how to apply neural natural language processing technologies and parallel

computing to make conceptual relationships explicit in a datastructure called a concept graph. In a concept graph, two concepts are connected by a directed edge if one relates to the other. It can further be developed into a concept prerequisite graph with directed edges if the concepts build upon another. During the project, we would like to create and publish a concept graph as a resource for CORON-19, an open dataset of currently 280K scholarly articles about the coronavirus.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110009 PAA - Projektvergabe Algorithmus

A. Jakoby

Projekt

Veranst. SWS:

10

Beschreibung

Aktuell findet die Projektzuteilung immer noch nur teilweise Algorithmen unterstützt statt. Dieses liegt vor allem in den unterschiedlichen Randbedingungen, die bei der Projektvergabe eine Rolle spielen. In diesem Projekt sollen die einzelnen Randbedingungen analysiert und daraus ein algorithmisches Vergabesystem implementiert werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programmierkenntnisse (Python)

Leistungsnachweis

Zwischen- und Abschlusspräsentation, Dokumentation

421110010 Projekt (VR) Creative

B. Fröhlich, A. Kulik, A. Kunert, E. Schott, S. Stickert

Projekt

Veranst. SWS:

10

Beschreibung

Die Erstellung digitaler 3D-Inhalte bewegt sich langsam von Desktop-Arbeitsplätzen zu immersiveren Umgebungen, in denen Benutzer ihre erlebte Welt, einschließlich interaktiver Verhaltensweisen, verändern können. Eine zunehmende Anzahl von Modellierungsanwendungen baut auf den Potenzialen der virtuellen Realität (VR) auf, aber Standards müssen sich erst noch herausbilden. Die 3D-Eingabegeräte sind zwar ausdrucksstärker, aber die Benutzer müssen im Vergleich zu Desktop-Oberflächen an Präzision und vielleicht sogar an Komfort einbüßen. Dies erfordert andere Ansätze bei der Erstellung und Verwaltung von Inhalten, z. B. intelligente Korrekturen der ungefähren Platzierung von Inhalten oder die Anwendung verschiedener Stile auf in Bezug stehende geometrische Strukturen.

Die Schnelligkeit der Interaktion kann in vielen Anwendungen sogar der Schlüssel sein, um z.B. den Flow in spielerischen, sozialen Umgebungen aufrechtzuerhalten. Im Kontext von sozialen Zusammenkünften sollte der ausdrucksstarke, kommunikative Wert von 3D-Skizzen gegenüber präziser 3D-Modellierung im Vordergrund stehen.

In diesem Projekt werden wir verfügbare Anwendungen und vorgeschlagene 3D-Interaktionstechniken für die kollaborative Erstellung interaktiver virtueller Umgebungen untersuchen. Wir werden die Vor- und Nachteile der verschiedenen Ansätze bewerten und eine Reihe von vielversprechenden Techniken in einem sozialen VR-Raum mit Unity und der portablen Oculus Quest implementieren

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programming skills as well as Unity skills are useful prerequisites.

Leistungsnachweis

Active and regular participation in the project work, intermediate oral presentations, final report

421110011 Real-Time Avatars for 3D Telepresence in Unity

B. Fröhlich, S. Beck, A. Kreskowski, G. Rendle
Projekt

Veranst. SWS: 10

Beschreibung

3D telepresence enables participants at different locations to meet and collaborate in a shared virtual environment using realistic representations of themselves. We presented the first [immersive group-to-group telepresence system in 2013](#). Since then, many fundamental technologies have been continuously improved; in particular, real-time 3D capturing and reconstruction of user representations. Such avatar representations are referred to as 3D video avatars or volumetric avatars in the literature.

Our server infrastructure for creating such volumetric avatars from colour and depth image streams implements state-of-the art 3D reconstruction techniques and supports the latest generation of Kinect colour and depth sensors for 3D capturing. In early 2020 we decided to use Unity as our virtual reality (VR) framework, to move closer to widespread adoption of our vision of social VR and 3D telepresence. In order to create VR applications in Unity, the capability to stream compact avatar representations from remote locations to Unity clients for rendering is, of course, fundamental.

In this project, we will focus on the design and implementation of a C++ plugin for Unity that receives volumetric avatar streams from our existing capture server and subsequently renders avatars' geometry and texture natively in Vulkan. Since the transfer of such rich 3D data over the internet still remains a bottleneck, we will also investigate how to efficiently compress the avatar streams using existing libraries and different data reduction approaches, such as level-of-detail reconstruction, as well as geometry and image compression.

At the beginning of this project, we will study related research and learn to use our existing infrastructure and technologies. On this basis, we will define our requirements, before designing and structuring our tasks to achieve our goal with an efficient implementation.

In case students are not equipped with recent hardware, we are able to provide workstations, head-mounted displays (HMDs), and pre-recorded Kinect streams for students to work with during the project. Meetings, presentations, and general communication will be held online. You will learn about and work on the following topics in your project team:

- Real-time rendering of avatar streams using state-of-the-art features of established graphics APIs with a focus on Vulkan & shader languages (Vulkan GLSL / GLSL)
- Native Render-Plugin Development in Unity
- Distributed multi-user virtual reality applications
- Design and implementation of a low-level rendering plugin for Unity clients that receives avatar streams over the internet from remote 3D reconstruction servers
- Design and implementation of one-to-many communication channels based on an existing network library (ZMQ)
- Compression techniques for geometry and texture streams, e.g. dimensionality reduction through principal component analysis
- Last, but certainly not least: Being a reliable team member in a complex software project

Bemerkung

time and place: t.b.a.

Voraussetzungen

As well as willingness to work in a team, and enthusiasm for learning about and developing rendering and compression techniques on cutting edge hardware, you should have the following competencies:

- Solid C++ skills, both conceptual and practical
- Basic analysis and linear algebra skills
- Previous experiences in computer graphics helpful
 - e.g. having worked with Vulkan, OpenGL or DirectX

If you are in doubt as to whether you fulfil the requirements, or if you have any further questions regarding the project, we are happy to have a discussion with you during the project fair on 6th of April. You can find us in our BigBlueButton room at the fair for the entire time between 5pm and 7pm.

Leistungsnachweis

The final assessment of your work will be conducted based on the project contributions of every team member, including:

- Active participation in the project during and in between weekly meetings
- Design, implementation and evaluation of a C++ Unity plugin for rendering avatars streamed from 3D reconstruction servers
- Intermediate talks
- Intermediate and final project presentations
- Documentation in form of a short paper

421110012 Rearranging Pixels VI

C. Wüthrich, F. Andreussi
Projekt

Veranst. SWS: 10

Beschreibung

Since the introduction of digital cameras, computer raster monitors and printing devices, the world of pixels has been ordered on a square based raster, limiting optimal signal sampling to two main directions, and creating collateral problems where the grid density causes undersampling of the light signal. This project will tackle the problem, exploring new and unconventional ways of sampling light signals. The focus will be set on the development of

new robust methods and on their evaluation, and compare traditional square sampling to the new methods. The conception and development of new devices will be a major focus of the project.

Bemerkung

Time and place will be announced at the project fair.

421110013 Robots in the Wild – Interacting with Robots in Public

E. Hornecker, B. Schulte, N.N.

Veranst. SWS: 10

Projekt

Mo, Einzel, 15:00 - 17:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), 21.06.2021 - 21.06.2021

Beschreibung

Automation is said to be on its way and we increasingly see news about robots taking over service in restaurants & hotels, deliver food or take on security on university campuses. Robots like this move in the public space and have to both interact with the people involved in their main tasks as well as bystanders, curious passers-by and others. But these instances are relatively rare and we are not yet used to these types of interventions.

In this project we will explore how people respond when they interact with robots "in the wild", i.e. outside, in shops, parks and other environments. The focus is not on the development of robots, but on creative exploration of the design space. Methods could include:

- Speculative Design: Building artefacts that are not necessarily functional, but tell a story through which we can ask questions about emerging technologies before they even exist. How could speculation be useful in the field of robotics beyond the (mostly dystopian or utopian) examples of sci-fi movies, but rather in an embodied, everyday situation?
- Technology Probes: What might it be like to engage with a robot in the wild? What better way to find out than to deploy one (functional, partly functional or completely Wizard of Oz). Probes are design artefacts that live with people for a while, to explore how they might affect people's life and how they are conceptualized. Using this approach, you could consider various form factors or means of interacting and focus on means to build and test those.

The project is highly open and exploratory but it is expected that it will lead to a (conceptual) prototype in addition to the study results. In this project, you will get hands-on insights into creative research and ideation methods, working in an exciting fast-moving technology field. You will further engage critically with existing technologies and future visions by considering their mundane consequences as well as their wider societal consequences.

Voraussetzungen

Participants should have basic knowledge or experience of user-centered methods (user studies, interviewing etc.) and ideally some experience in prototyping techniques. Depending on the students' interests, working with micro-controllers such as Arduino, Raspberry Pi, or basic robotic kits might be an option and support will be given if needed. In addition, all participants should enjoy working in an interdisciplinary team, want to be creative and be able to converse in English.

Leistungsnachweis

Active participation and interim presentations, autonomous and self-initiated working mode, project documentation.

421110014 SACPC – Simulation von Probabilistischen Schaltkreisen

A. Jakoby

Veranst. SWS: 10

Projekt

Beschreibung

Probabilistische Schaltkreise stellen ein Modell zur Simulation von analogen Berechnungen. In diesem Projekt sollen die unterschiedlichen Modelle von probabilistischen Schaltkreisen und deren Anwendbarkeit für analoge Berechnungen untersucht werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programmierkenntnisse (Python)

Leistungsnachweis

Zwischen- und Abschlusspräsentation, Dokumentation

421110015 Understanding Social Investing Hype

B. Stein, N. Kolyada, M. Völske, M. Wiegmann
Projekt

Veranst. SWS: 10

Beschreibung

The last few years have seen an unprecedented boom in retail investment, driven largely by decentralized coordination in active online communities and a new breed of easy-to-use, extremely low-barrier-to-entry investment apps. This new level of public participation both liberated the investment business and opened new markets but also created several new, large-scale economic phenomena. In this project we will analyze social media datasets with an eye to large-scale economic phenomena, and tackle research questions related to social media analysis, author profiling, computational ethics, and the interplay between social media and market sentiment. We will employ big data tools, machine learning, and natural language processing.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110016 Web Almanac revisited

B. Stein, J. Bevendorff, M. Gohsen, M. Völske
Projekt

Veranst. SWS: 10

Beschreibung

The Web Almanac (<https://almanac.httparchive.org/>) is an annual report of statistics around common design practices in the WWW which are extracted from 7.5 million web pages. With a crawl of the Web Archive at hand, we will reproduce these statistics, compare them to the Web Almanac, and validate or invalidate them with much more than 7.5 million pages. Participants of this project will learn how to handle big data with

cluster computing technologies and will develop a reusable analysis pipeline for obtaining dependable statistics.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110017 What's that about? Knowledge and Argument Graphs in Voice Search

B. Stein, M. Gohsen, J. Kiesel

Veranst. SWS: 10

Projekt

Beschreibung

Teaching a computer to reason has been a dream and challenge to computer science ever since. Knowledge graphs like Wikidata---that contains the information from Wikipedia---are a major milestone in this endeavor. The automatic transformation of everyday language questions into formal query languages is yet another one. In this project we will focus on combining these methods for the domain of argument search, specifically for our argument search engine args.me and it's Alexa-powered voice interface.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110019 NAIS – Network Attached Insecurities

S. Lucks, J. Boßert, N. Lang

Veranst. SWS: 10

Projekt

Beschreibung

Das Internet of Things (IoT) wächst beständig und täglich kommen neue Produkte heraus. Diese bringen verschiedenste Sensoren und Kontrollmechanismen in das Haus der Kunden, welche deren Leben vereinfachen sollen. Jedoch sind diese Geräte oftmals nicht zureichend vor dem Zugriff von Außenstehenden geschützt. In diesem Projekt sollen verschiedene IoT Produkte in dieser Hinsicht untersucht werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Solid programming skills

And at least one of the following:

- Introduction to Modern Cryptography
- Experience with microcontrollers

Leistungsnachweis

Zwischenpräsentation, Abschlusspräsentation, Abschlussbericht

421150038 Recent Results in Cryptographic Research

S. Lucks

Seminar

Veranst. SWS:

2

Beschreibung

In dem Seminar werden aktuelle Veröffentlichungen aus dem Feld der Kryptographie gelesen und erarbeitet. Der Schwerpunkt dieses Seminars wird im ersten Treffen bekanntgegeben.

Bemerkung

-online-

erste Veranstaltung: zu Beginn der Vorlesungsfreien Zeit

Leistungsnachweis

Vortrag und wissenschaftliche Ausarbeitung

4526501 Academic English Part One

G. Atkinson

Kurs

Di, wöch., 17:00 - 18:30, Online (Moodle) , ab 20.04.2021

Veranst. SWS:

2

Beschreibung

This is the first part of a two-part course which aims to improve your ability to express yourself clearly in written English and to develop a suitably coherent academic writing style. Part One concentrates mainly on structure in writing academic articles, essays and reports. We begin by examining the structure of individual paragraphs and move on to extended texts of various types (e.g. process essays, cause/effect, comparison/contrast, etc.). Particular attention is paid to connectives, i.e. transitional phrases and constructions which help you link ideas and paragraphs in a logical, systematic way.

The course will be conducted basically in an online correspondence format with occasional video consultations and/or face-to-face teaching sessions if and as required. The time allocated for these is Tues 17.00-18.30. The individual dates, if required, will be determined as the course progresses

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part Two and those who need to repeat Academic English Part One**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE I Registration.

Leistungsnachweis

continuous assessment

4526502 Academic English Part Two

G. Atkinson

Veranst. SWS: 2

Kurs

Mi, wöch., 17:00 - 18:30, Online (Moodle) , ab 21.04.2021

Beschreibung

Part Two of the Academic English course concentrates on improving and refining aspects of academic writing style. It includes sections on clause and sentence structure, punctuation rules and how to incorporate quotations, statistics and footnotes into academic texts.

The course will be conducted basically in an online correspondence format with occasional video consultations and/or face-to-face teaching sessions if and as required. The time allocated for these is Weds 17.00-18.30. The individual dates, if required, will be determined as the course progresses.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part One and those who need to repeat Academic English Part Two**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE II Registration.

Leistungsnachweis

continuous assessment

4555211 Algorithmen und Datenstrukturen

C. Wüthrich, F. Andreussi, Projektbörse Fak. KuG

Veranst. SWS: 4

Vorlesung

Do, wöch., 11:00 - 12:30, Vorlesung / Lecture (online) <https://moodle.uni-weimar.de/course/view.php?id=31390>, ab 15.04.2021

Fr, wöch., 11:00 - 12:30, Übung / Exercise (online), ab 23.04.2021

Fr, wöch., 15:15 - 16:45, Übung / Exercise (online), ab 23.04.2021

Do, Einzel, 10:00 - 12:00, Prüfung / exam Falkenburg / Innensporthalle, 05.08.2021 - 05.08.2021

Beschreibung

Das Lernziel dieser Veranstaltung soll zum einen der generelle Umgang und die selbstständige Entwicklung, Analyse, und Optimierung von Algorithmen und Datenstrukturen sein. Zum anderen soll ein Überblick über gängige problemspezifische Verfahren und deren Anwendung in der Praxis vermittelt werden.

engl. Beschreibung/ Kurzkomentar

Algorithms and Data Structures

The lecture deals with the principle and the implementation of basic algorithms and data structures. The course teaches among all, the Strings, geometric problems, graphs, mathematical algorithms and NP-complete problems.

Leistungsnachweis

Beleg, Klausur

4555262 Visualisierung

B. Fröhlich, N.N., J. Reibert, G. Rendle

Veranst. SWS: 3

Vorlesung

Do, wöch., 13:30 - 15:00, Vorlesung/Lecture - taught online (live&recorded)- Moodle: <https://moodle.uni-weimar.de/course/view.php?id=31089> , ab 08.04.2021

Mo, wöch., 17:00 - 18:30, Übung /Lab class (Master) - taught online (live sessions) - , ab 12.04.2021

Di, wöch., 11:00 - 12:30, Übung (Bachelor) - taught online (live sessions)- , ab 13.04.2021

Mo, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal A, schriftl. Prüfung / witten exam, 27.09.2021 - 27.09.2021

Beschreibung

Im ersten Teil der Veranstaltung werden die wichtigsten Verfahren und Techniken aus dem Bereich der Informationsvisualisierung für folgende Datentypen vorgestellt: multi-dimensionale und hierarchische Daten, Graphen, Zeitreihen und mengenbasierte Daten. Der zweite Teil beschäftigt sich mit verschiedenen Ansätzen und Algorithmen zur Visualisierung volumetrischer und vektorieller Simulations- und Messdaten. Die Veranstaltung wird englischsprachig angeboten.

In den Übungen werden eine Auswahl der in den Vorlesungen vorgestellten Visualisierungsansätze umgesetzt, getestet und evaluiert. Ein separates Abschlussprojekt wird angeboten und mit zusätzlich 1,5 ETCS angerechnet.

Bemerkung

Bitte beachten Sie:

um 6ECTS Punkte zu erhalten, ist zusätzlich der Kurs "[Visualization - Final Project](#)" verpflichtend zu belegen.

Voraussetzungen

Programmierkenntnisse sowie gute Kenntnisse von Algorithmen und Datenstrukturen sind erforderlich, z.B. nachgewiesen durch den erfolgreichen Abschluss der entsprechenden Lehrveranstaltungen des Bachelor-Studiengangs Medieninformatik. In den Laborveranstaltungen werden JavaScript- und grundlegende GLSL-Programmierung eingesetzt. Grundkenntnisse der Computergrafik sind hilfreich, z.B. erworben durch die Vorlesung Computergrafik im Bachelor-Studiengang Medieninformatik.

Leistungsnachweis

Vorlesungsbegleitende Übungen, mündliche oder schriftliche Prüfung.

Ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1.5 ECTS.

4555403 Komplexitätstheorie

A. Jakoby

Veranst. SWS: 3

Vorlesung

Di, gerade Wo, 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, Vorlesung Bis auf Weiteres: online Moodle-Link: <https://moodle.uni-weimar.de/course/view.php?id=30965>, ab 06.04.2021

Mi, wöch., 11:00 - 12:30, Bauhausstraße 11 - Seminarraum 015, Übung Bis auf Weiteres: online , ab 07.04.2021

Di, Einzel, 08:00 - 18:00, Marienstraße 13 C - Hörsaal C, Wiederholung, 14.09.2021 - 14.09.2021

Do, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal D, schriftl. Prüfung, 23.09.2021 - 23.09.2021

Beschreibung

Lernziel Ziel ist die Vermittlung grundlegender Kenntnisse, Denkweisen und Konzepte der Komplexitätstheorie. Als Folgerung sollen den Studierenden die prinzipiellen Möglichkeiten und Grenzen der Informationsverarbeitung aufgezeigt werden.

Zentrale Themen sind

- Komplexitätsklassen
- Reduktion
- Effizienz versus Aufwendig
- NP vollständige Probleme

engl. Beschreibung/ Kurzkomentar

Complexity Theory

The aim this course is to impart basic knowledge on concepts of complexity theory. The course present knowledge on the limits of information processing.

Key topics include

- Complexity Classes
- Reductions
- Efficiency versus Intractability
- NP complete problems

Voraussetzungen

Diskrete Mathematik

Leistungsnachweis

Klausur

Master

205007 Modelling of steel structures and numerical simulation (L + E)

M. Kraus, S. Mämpel

Veranst. SWS: 4

Vorlesung

1-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, Exercise

1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise

2-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, Exercise

2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Exercise

Mo, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal A, Lecture Hybrid

Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal B, Lecture Hybrid

Beschreibung

The students will be familiar with skills and expertise in the field of nonlinear structural analyses. Extensive knowledge of theoretical basics and modern modelling methods including numerical representations are the aim of the course. The students will acquire skills in handling advanced tools for the analysis and the design of structures.

Design of steel structures using finite element methods; basics of the design; modelling of structures and loads; nonlinear material behaviour, numerical analyses of steel-members and structures regarding geometric and physical nonlinearities; stability behaviour of members including flexural and lateral torsional buckling

Leistungsnachweis

1 Project report

"Modelling of steel structures and numerical simulation" (0%) / **SuSe**

1 written exam

"Modelling of steel structures and numerical simulation"/ 120 min (100%) / **SuSe + WiSe**

301013 Advanced modelling - calculation/CAE (L + E)

K. Gürlebeck, D. Legatiuk

Veranst. SWS: 4

Vorlesung

Di, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

Scientifically orientated education in mathematical modelling and computer science in view of a complex interdisciplinary and networked field of work and research, modelling and simulation.

Students will have experience in Computer Aided Engineering (CAE) by establishing a problem specific model on the basis of a mathematical formulation, an applicable solution technique, design of efficient data structures and software implementation.

Numerical and analytical solution of partial differential equations, series expansions, integral representations, finite difference methods, description of heat flow, diffusion, wave propagation and elastostatic problems.

The topics are discussed theoretically and then implemented.

Convergence, stability and error analysis of finite difference methods (FDM). Modelling of steady and unsteady heat conduction problems, wave propagation and vibrations and problems from linear thermo-elasticity in 2D and 3D. After considering the mathematical basis, the students will work on individual projects passing all levels of work (engineering model, mathematical model, numerical model, computer model, simulation, evaluation).

The solution methods will be implemented by help of MAPLE or MATLAB.

Bemerkung

This lecture replaces "Advanced Analysis". It is therefore not possible to receive credits for both courses.

Die Veranstaltung ersetzt "Advanced Analysis" und kann daher nicht gemeinsam mit dieser Veranstaltung angerechnet werden.

Leistungsnachweis

1 Project report + Presentation

"Advanced Modelling – Calculation/CAE" (100%) / **SuSe**

303002 Simulation Methods in Engineering

C. Koch, M. Artus

Veranst. SWS: 4

Vorlesung

Fr, wöch., 09:15 - 10:45, Lecture (online) Moodle: <https://moodle.uni-weimar.de/course/view.php?id=31066>, ab 09.04.2021

Mo, wöch., 07:30 - 09:00, Exercise (online), ab 12.04.2021

Fr, wöch., 13:30 - 15:00, Exercise (online)

engl. Beschreibung/ Kurzkomentar

Simulation Methods in Engineering

Content:

- System analysis and modelling
- System dynamics
- Discrete event simulation
- Multi-agent simulation
- Input data and stochastic simulation
- Simulation based optimization
- Introduction to the software AnyLogic

Target qualifications:

This module provides students with comprehensive knowledge about computer based simulation concepts to address practical challenges in engineering. Modern simulation and optimization software is introduced within tutorials. The module project (coursework) offers an opportunity to students to work in groups on current problems in the context of civil and environmental engineering (e.g. production logistics, pedestrian simulation, pollutant dispersion). Using object-oriented simulation software the students will analyze, model and simulate different engineering systems. The programming is carried out using Java. Also the students acquire team working and presentation skills.

Voraussetzungen

Recommended requirements for participation: Basic knowledge of programming

Leistungsnachweis

Short group report, group presentation, written exam

401007 Structural Engineering Models**C. Könke**

Veranst. SWS: 4

Integrierte Vorlesung

Mo, Einzel, 11:30 - 13:00, Marienstraße 13 C - Hörsaal A, written exam, 26.07.2021 - 26.07.2021

Di, wöch., 15:00 - 16:45, Marienstraße 13 C - Hörsaal D, Lecture (in person teaching/hybrid)

Do, wöch., 15:00 - 16:45, Marienstraße 13 C - Hörsaal C, Exercise (in person teaching/hybrid)

Beschreibung

Student will be able to build an abstract model for structural engineering problem and to assess its restriction and quality. The student will be able to perform dimension reduction in structural engineering using concepts from structural mechanics. They will be capable of classify different types of civil engineering structures and to distinguish different principal load transfer processes. The student can classify linear/nonlinear problems and time variant/invariant problems in structural engineering.

Fundamental equations in structural mechanics for 1D, 2D and 3D structures, equilibrium equation, kinematic relation, constitutive law, Method to establish the governing differential equations, Differences between geometric / physical linear and non-linear problems, Classification of different types of structures: truss, beam, plate, shell problems

Voraussetzungen

basic course in structural mechanics

basic course in applied mathematics

Leistungsnachweis

written test

Requirements for exam registration: 2 home works accepted

417130003 Discrete Optimization

A. Jakoby

Veranst. SWS: 4

Vorlesung

Do, wöch., 11:00 - 12:30, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Lecture / lab class (until further notice: online, live), ab 08.04.2021

Di, wöch., 15:15 - 16:45, lecture (online, live) Moodle-Link: <https://moodle.uni-weimar.de/course/view.php?id=30962>

Beschreibung

Diskrete Optimierung

Die diskrete / kombinatorische Optimierung ist ein Gebiet an der Schnittstelle von Mathematik und Informatik. Anwendungen für derartige Optimierungsprobleme sind in den vielfältigsten Bereichen zu finden.

Betrachtet werden sowohl diskrete Optimierungsprobleme, die effizient lösbar sind (kürzeste Wege, Flußprobleme), als auch NP-schwierige Probleme. Für letztere werden sowohl exakte Verfahren (Greedy-Algorithmen über Matroiden, Branch-and-Bound-Verfahren), als auch Heuristiken und Metaheuristiken zur näherungsweise Lösung behandelt.

engl. Beschreibung/ Kurzkomentar

Discrete Optimization

Discrete / combinatorial optimization is an area at the borderline of mathematics and computer science. Applications for such optimization problems can be found in the most varied areas.

Consideration is given to discrete optimization problems, which are efficiently solvable (e.g. shortest paths, flow problems), as well as NP-hard problems. For the latter, both exact methods (greedy algorithms on matroids, branch-and-bound methods), as well as heuristics and metaheuristics, are introduced.

Voraussetzungen

Bsc in a relevant study field

Leistungsnachweis

oral examination (individual appointments via Moodle)

417290000 Software Engineering (M.Sc.)

N. Ruckel

Veranst. SWS: 3

Vorlesung

Mo, wöch., 15:15 - 16:45, Lecture (online) <https://moodle.uni-weimar.de/course/view.php?id=31474>, ab 12.04.2021

Fr, wöch., 15:15 - 16:45, Exercise (online), ab 16.04.2021

Mo, Einzel, 09:00 - 11:00, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 02.08.2021 - 02.08.2021

engl. Beschreibung/ Kurzkomentar

Software Engineering (M.Sc.)

Developing software requires more than just programming skills. Answering conceptual questions is perhaps even more important than excellent knowledge of a programming language. This course introduces participants to the basics of structured software development. During the course of a larger development project, the presented techniques will be exercised in practice. Topics include all phases of the development process, such as requirements analysis, UML modelling, design patterns or agile development.

Voraussetzungen

programming skills

Leistungsnachweis

Exercise assignments + written exam

418260002 Security Engineering**S. Lucks, J. Boßert**

Veranst. SWS: 3

Vorlesung

Di, wöch., 11:00 - 12:30, Lecture (online) Moodle-Link: <https://moodle.uni-weimar.de/enrol/index.php?id=31868>, ab 06.04.2021

Mi, wöch., 09:15 - 10:45, Lab class (online), ab 14.04.2021

Beschreibung

Die Entwicklung sicherer und vertraulicher Systeme ist eine Herausforderung für System-Architekten als auch für Software-Entwickler. Die IT-Sicherheit wird durch das immer größer werdende Bewusstsein in der Politik und den Massenmedien zu einem stetig wachsenden und wichtigen Aspekt in der IT-Industrie.

In dieser Vorlesung wird die Programmiersprache Ada'05 (bzw. Ada'12) eingeführt, welche heutzutage als geeignete Sprache für die Implementierung sicherer und vertraulicher Systeme betrachtet wird.

Desweiteren werden Methoden aus dem Feld des Software-Engineering präsentiert, welche es ermöglichen, Software-Systeme sicher, vertraulich und benutzbar zu gestalten.

engl. Beschreibung/ Kurzkomentar

Security Engineering

The development of safe and reliable systems is a challenging task for both system architects and software developer.

Due to the raising awareness of the politics and mass media, IT-security is becoming an increasingly important aspect of the IT industry.

The course introduces the programming language Ada'05, which is considered particularly suitable for implementing secure and reliable systems. In addition, methods from the field of software engineering are presented, which serve the safety, reliability and maintainability of software systems.

Bemerkung

Die Veranstaltung ersetzt "Software Development for Safe and Secure Systems" und kann daher nicht gemeinsam mit dieser Veranstaltung angerechnet werden.

This lecture replaces "Software Development for Safe and Secure Systems". It is therefore not possible to receive credits for both courses.

Leistungsnachweis

Schriftliche Klausur oder mündliche Prüfung
(abhängig von der Anzahl an Teilnehmern)
Beleg als Voraussetzung zur Klausur/Prüfung

419140050 Introduction to Modern Cryptography

S. Lucks, N. Lang

Veranst. SWS: 3

Vorlesung

Di, Einzel, 13:30 - 15:00, Q&A-Session, LH, HK7, 21.09.2021 - 21.09.2021

Mo, wöch., 11:00 - 12:30, Lecture (online) Moodle-Link: <https://moodle.uni-weimar.de/enrol/index.php?id=31813>

Di, wöch., 15:15 - 16:45, Lab class (online)

Beschreibung

Früher galt die Kryptographie als Werkzeug für Militärs, Geheimdienste und Diplomaten. Aus dieser Zeit stammt auch noch die berühmte Enigma-Chiffriermaschine.

Heute entwickelt sich die Kryptographie buchstäblich zu einer Schlüsseltechnologie für sichere Kommunikation und Mediennutzung. Von der Öffentlichkeit kaum bemerkt hat die Kryptographie schon längst Einzug gehalten in alltäglich genutzte Geräte wie Geldautomaten und Mobiltelefone.

Der Entwurf kryptographischer Komponenten ist schwierig, und in der Praxis trifft man oft auf erhebliche Entwurfsfehler. (Dies kommentiert der IT-Sicherheitsexperte Bruce Schneier mit drastischen Worten: "Milliarden von Dollar werden für Computersicherheit ausgegeben, und das Meiste davon wird für unsichere Produkte verschwendet.")

Nicht nur der Entwurf kryptographischer Komponenten ist schwierig, auch der Einsatz von "an sich guten" Komponenten für sichere IT-systeme ist fehlerträchtig und erfordert ein genaues Verständnis der jeweiligen Bedingungen, unter denen eine kryptographische Komponente als "sicher" gelten kann.

Die Vorlesung gibt einen Einblick in Denkweise und Methodik der Mediensicherheit und der modernen Kryptographie und die Anwendung der Kryptographie, um Sicherheitsprobleme zu lösen.

engl. Beschreibung/ Kurzkomentar

Bemerkung

Die Studierenden dürfen bisher keine Einführung in Kryptographie besucht haben. Zum Nachweis sind bei der Anmeldung zur Prüfung die "Transcript of Records" aus früheren Studien vorzulegen.

Für Studierende, die in ihrem früheren Bachelor-Studium keine Einführung in die Kryptographie besucht haben, ist die Veranstaltung ihrerseits Zulassungsvoraussetzung für fortgeschrittene Kryptographie-Vorlesungen.

Voraussetzungen

Die Studierenden dürfen bisher keine Einführung in Kryptographie besucht haben. Zum Nachweis sind bei der Anmeldung zur Prüfung die "Transcript of Records" aus früheren Studien vorzulegen.

Leistungsnachweis

M.Sc.: Mündliche Prüfung
Beleg als Voraussetzung zur Klausurzulassung

421110000 Applied Deep Learning for Computer Vision

V. Rodehorst, J. Eick, D. Tschirschwitz

Projekt

Beschreibung

During this practice-oriented Deep Learning project, we will implement current state-of-the-art models for solving difficult tasks in the field of computer vision. During the course of the project the participants will learn how to implement and adapt models for image classification, segmentation, etc to varying problem domains. The landscape of data driven approaches is rapidly changing and researchers need a good understanding of the required tools, publicly available datasets and methods. The students will learn the design and evaluation of existing models, and how to leverage these skills to adapt and implement own models.

Bemerkung

Mandatory technology stack (no other framework allowed):

- Python
- PyTorch

Voraussetzungen

Successful completion of the course "Image Analysis and Object Recognition"

Good programming skills in Python

Leistungsnachweis

Active participation, presentations and project documentation (e.g. commented repositories)

421110002 DESIGNING OUT OF THE BOX

M. Honauer, E. Hornecker, Projektbörse Fak. KuG

Veranst. SWS: 10

Projekt

Di, wöch., 13:30 - 16:45, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), 01.06.2021 - 20.07.2021

Di, Einzel, 10:00 - 15:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Projekttreffen, 27.07.2021 - 27.07.2021

Beschreibung

Research through Design (RtD) is an approach to employ design practices and generate new knowledge. The design inquiries carried out by RtD result in a critical reflection of the state of the art. RtD provides a base for reflective practice by reinterpreting and reframing existing problems through creating and revising artifacts. These artifacts act as proposed solutions to the raised issues, investigating how we can change or improve the world.

Traditional HCI research typically investigates existing products and systems. It builds upon theories of users' needs and catalogs of technical requirements to create new interactive designs, rather than exploring a complex topic more broadly and critically questioning existing standards. More recent paths in HCI integrate RtD as an approach to construct intentional designs that inform the dialogue between the currently existing and what could be.

In this course, students will explore RtD as an approach to create their own project in the scope of the given semester topic, *Sustainability*. It is open to every student to find and explore their specific area of interest in that field. It could be anything as long as it is critically approached from a sustainability perspective – for example, cryptocurrencies (a creative concept for making Bitcoins' energy consumption transparent), the fashion industry (a crafted line of clothing from recycled electronic materials), anti-authoritarian education (fiction on the non-future of conservative values), or DIY communities (a series of fantasy tutorials for homemade, 3D-printed repairs). After familiarizing ourselves with the chosen topics, every student will create and evaluate an interactive artifact throughout the course. Students will document their process and iteratively develop their individual projects through critical reflection alone and in the class.

Bemerkung

time and place: t.b.a.

participants:

HCI/CSM4D/Mi : 4

PD/MA: 2

Total: 6

Language: English (if there's at least one Non-Native-German-Speaker)

Voraussetzungen

High motivation to explore a multidisciplinary topic,

ability to work self-organized & in teams,

fluent conversation in English,

(prior experiences in creative coding or physical computing are supportive but not a requirement for enrollment)

Students of Product-Design and Media Architecture: Please send a short informal application email to michaela.honauer@uni-weimar.de until Tuesday April 6th! In this email, please explain 1) why you want to join us in this course (what seems most interesting to you), 2) what are your prior experiences in the relevant field (no worries if you have none, then just make this transparent), and 3) show us up to three of your prior design/art projects (in or outside of the University).

Leistungsnachweis

Regular presentations & discussions, documentation of the process, commitment to shared goals & deadlines,

submission of assignments, video presentation & exhibition at summaery, final report

421110003 FL BaSe – Formal-Language Based Security

S. Lucks, J. Boßert, N. Lang
Projekt

Veranst. SWS: 10

Beschreibung

Wenn binäre Daten als Byte-Strom verschickt werden, braucht man eine „Datenserialisierungssprache“ (DSL). Im Unterschied zu menschenlesbaren Sprachen gibt es viele DSLs, die Daten variabler Länge als Längenpräfix-Sprachen implementieren. Das Ziel des Projektes besteht darin, eine Erweiterung der EBNF (der „extended Backus-Naur Form“) einzuführen, und einen Prototyp für einen Parser- Generator für derartige Sprachen zu implementieren.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Discrete Mathematics
Formal Languages
Solid programming skills

Leistungsnachweis

Zwischenpräsentation, Abschlusspräsentation, Abschlussbericht

421110004 Gamifizierung von Lerninhalten

C. Wüthrich, G. Pandolfo
Projekt

Veranst. SWS: 10

Bemerkung

time and place: t.b.a.

421110005 Hot Topics in Computer Vision SoSe21

V. Rodehorst, C. Benz, P. Debus, M. Kaisheva
Projekt

Beschreibung

Die Teilnehmer werden an ein aktuelles forschungs- oder industrierelevantes Thema herangeführt. Es ist nicht beabsichtigt einen festgelegten Bereich in voller Breite zu explorieren. Stattdessen werden die Teilnehmer mit der vollen Komplexität eines begrenzten Themas konfrontiert und die Eigeninitiative gefördert. Es ermöglicht einen Einblick in die Forschungs- und Entwicklungsprojekte des Fachgebiets.

Bemerkung

Ort und Zeit werden zur Projektbörse bekanntgegeben.

Voraussetzungen

Gute Programmierkenntnisse (z.B. C/C++, MATLAB, OpenCL)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

421110006 Human echolocation in video games for the blind

J. Ehlers
Projekt

Veranst. SWS: 10

Bemerkung

time and place: t.b.a.

421110007 Large-Scale Concept Mining in Scientific Publications

B. Stein, J. Bevendorff, T. Gollub, N. Kolyada, M. Wolska
Projekt

Veranst. SWS: 10

Beschreibung

Scientific publications can be regarded as contributions to a complex asynchronous and multi-threaded conversation about specific research questions. Scientists develop and describe their own ideas and relate them to and compare them with previous related ideas and concepts in the field. In this project, you will learn how to apply neural natural language processing technologies and parallel computing to make conceptual relationships explicit in a datastructure called a concept graph. In a concept graph, two concepts are connected by a directed edge if one relates to the other. It can further be developed into a concept prerequisite graph with directed edges if the concepts build upon another. During the project, we would like to create and publish a concept graph as a resource for CORD-19, an open dataset of currently 280K scholarly articles about the coronavirus.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110009 PAA - Projektvergabe Algorithmus

A. Jakoby
Projekt

Veranst. SWS: 10

Beschreibung

Aktuell findet die Projektzuteilung immer noch nur teilweise Algorithmen unterstützt statt. Dieses liegt vor allem in den unterschiedlichen Randbedingungen, die bei der Projektvergabe eine Rolle spielen. In diesem Projekt sollen die einzelnen Randbedingungen analysiert und daraus ein algorithmisches Vergabesystem implementiert werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programmierkenntnisse (Python)

Leistungsnachweis

Zwischen- und Abschlusspräsentation, Dokumentation

421110010 Projekt (VR) Creative

B. Fröhlich, A. Kulik, A. Kunert, E. Schott, S. Stickert

Veranst. SWS: 10

Projekt

Beschreibung

Die Erstellung digitaler 3D-Inhalte bewegt sich langsam von Desktop-Arbeitsplätzen zu immersiveren Umgebungen, in denen Benutzer ihre erlebte Welt, einschließlich interaktiver Verhaltensweisen, verändern können. Eine zunehmende Anzahl von Modellierungsanwendungen baut auf den Potenzialen der virtuellen Realität (VR) auf, aber Standards müssen sich erst noch herausbilden. Die 3D-Eingabegeräte sind zwar ausdrucksstärker, aber die Benutzer müssen im Vergleich zu Desktop-Oberflächen an Präzision und vielleicht sogar an Komfort einbüßen. Dies erfordert andere Ansätze bei der Erstellung und Verwaltung von Inhalten, z. B. intelligente Korrekturen der ungefähren Platzierung von Inhalten oder die Anwendung verschiedener Stile auf in Bezug stehende geometrische Strukturen.

Die Schnelligkeit der Interaktion kann in vielen Anwendungen sogar der Schlüssel sein, um z.B. den Flow in spielerischen, sozialen Umgebungen aufrechtzuerhalten. Im Kontext von sozialen Zusammenkünften sollte der ausdrucksstarke, kommunikative Wert von 3D-Skizzen gegenüber präziser 3D-Modellierung im Vordergrund stehen.

In diesem Projekt werden wir verfügbare Anwendungen und vorgeschlagene 3D-Interaktionstechniken für die kollaborative Erstellung interaktiver virtueller Umgebungen untersuchen. Wir werden die Vor- und Nachteile der verschiedenen Ansätze bewerten und eine Reihe von vielversprechenden Techniken in einem sozialen VR-Raum mit Unity und der portablen Oculus Quest implementieren

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programming skills as well as Unity skills are useful prerequisites.

Leistungsnachweis

Active and regular participation in the project work, intermediate oral presentations, final report

421110011 Real-Time Avatars for 3D Telepresence in Unity

B. Fröhlich, S. Beck, A. Kreskowski, G. Rendle

Veranst. SWS: 10

Projekt

Beschreibung

3D telepresence enables participants at different locations to meet and collaborate in a shared virtual environment using realistic representations of themselves. We presented the first [immersive group-to-group telepresence system in 2013](#). Since then, many fundamental technologies have been continuously improved; in particular, real-time 3D capturing and reconstruction of user representations. Such avatar representations are referred to as 3D video avatars or volumetric avatars in the literature.

Our server infrastructure for creating such volumetric avatars from colour and depth image streams implements state-of-the-art 3D reconstruction techniques and supports the latest generation of Kinect colour and depth sensors for 3D capturing. In early 2020 we decided to use Unity as our virtual reality (VR) framework, to move closer to widespread adoption of our vision of social VR and 3D telepresence. In order to create VR applications in Unity, the capability to stream compact avatar representations from remote locations to Unity clients for rendering is, of course, fundamental.

In this project, we will focus on the design and implementation of a C++ plugin for Unity that receives volumetric avatar streams from our existing capture server and subsequently renders avatars' geometry and texture natively in Vulkan. Since the transfer of such rich 3D data over the internet still remains a bottleneck, we will also investigate how to efficiently compress the avatar streams using existing libraries and different data reduction approaches, such as level-of-detail reconstruction, as well as geometry and image compression.

At the beginning of this project, we will study related research and learn to use our existing infrastructure and technologies. On this basis, we will define our requirements, before designing and structuring our tasks to achieve our goal with an efficient implementation.

In case students are not equipped with recent hardware, we are able to provide workstations, head-mounted displays (HMDs), and pre-recorded Kinect streams for students to work with during the project. Meetings, presentations, and general communication will be held online. You will learn about and work on the following topics in your project team:

- Real-time rendering of avatar streams using state-of-the-art features of established graphics APIs with a focus on Vulkan & shader languages (Vulkan GLSL / GLSL)
- Native Render-Plugin Development in Unity
- Distributed multi-user virtual reality applications
- Design and implementation of a low-level rendering plugin for Unity clients that receives avatar streams over the internet from remote 3D reconstruction servers
- Design and implementation of one-to-many communication channels based on an existing network library (ZMQ)
- Compression techniques for geometry and texture streams, e.g. dimensionality reduction through principal component analysis
- Last, but certainly not least: Being a reliable team member in a complex software project

Bemerkung

time and place: t.b.a.

Voraussetzungen

As well as willingness to work in a team, and enthusiasm for learning about and developing rendering and compression techniques on cutting edge hardware, you should have the following competencies:

- Solid C++ skills, both conceptual and practical
- Basic analysis and linear algebra skills
- Previous experiences in computer graphics helpful

- e.g. having worked with Vulkan, OpenGL or DirectX

If you are in doubt as to whether you fulfil the requirements, or if you have any further questions regarding the project, we are happy to have a discussion with you during the project fair on 6th of April. You can find us in our BigBlueButton room at the fair for the entire time between 5pm and 7pm.

Leistungsnachweis

The final assessment of your work will be conducted based on the project contributions of every team member, including:

- Active participation in the project during and in between weekly meetings
- Design, implementation and evaluation of a C++ Unity plugin for rendering avatars streamed from 3D reconstruction servers
- Intermediate talks
- Intermediate and final project presentations
- Documentation in form of a short paper

421110012 Rearranging Pixels VI

C. Wüthrich, F. Andreussi

Veranst. SWS: 10

Projekt

Beschreibung

Since the introduction of digital cameras, computer raster monitors and printing devices, the world of pixels has been ordered on a square based raster, limiting optimal signal sampling to two main directions, and creating collateral problems where the grid density causes undersampling of the light signal. This project will tackle the problem, exploring new and unconventional ways of sampling light signals. The focus will be set on the development of new robust methods and on their evaluation, and compare traditional square sampling to the new methods. The conception and development of new devices will be a major focus of the project.

Bemerkung

Time and place will be announced at the project fair.

421110013 Robots in the Wild – Interacting with Robots in Public

E. Hornecker, B. Schulte, N.N.

Veranst. SWS: 10

Projekt

Mo, Einzel, 15:00 - 17:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), 21.06.2021 - 21.06.2021

Beschreibung

Automation is said to be on its way and we increasingly see news about robots taking over service in restaurants & hotels, deliver food or take on security on university campuses. Robots like this move in the public space and have to both interact with the people involved in their main tasks as well as bystanders, curious passers-by and others. But these instances are relatively rare and we are not yet used to these types of interventions.

In this project we will explore how people respond when they interact with robots "in the wild", i.e. outside, in shops, parks and other environments. The focus is not on the development of robots, but on creative exploration of the design space. Methods could include:

- Speculative Design: Building artefacts that are not necessarily functional, but tell a story through which we can ask questions about emerging technologies before they even exist. How could speculation be useful in the field of

robotics beyond the (mostly dystopian or utopian) examples of sci-fi movies, but rather in an embodied, everyday situation?

- **Technology Probes:** What might it be like to engage with a robot in the wild? What better way to find out than to deploy one (functional, partly functional or completely Wizard of Oz). Probes are design artefacts that live with people for a while, to explore how they might affect people's life and how they are conceptualized. Using this approach, you could consider various form factors or means of interacting and focus on means to build and test those.

The project is highly open and exploratory but it is expected that it will lead to a (conceptual) prototype in addition to the study results. In this project, you will get hands-on insights into creative research and ideation methods, working in an exciting fast-moving technology field. You will further engage critically with existing technologies and future visions by considering their mundane consequences as well as their wider societal consequences.

Voraussetzungen

Participants should have basic knowledge or experience of user-centered methods (user studies, interviewing etc.) and ideally some experience in prototyping techniques. Depending on the students' interests, working with micro-controllers such as Arduino, Raspberry Pi, or basic robotic kits might be an option and support will be given if needed. In addition, all participants should enjoy working in an interdisciplinary team, want to be creative and be able to converse in English.

Leistungsnachweis

Active participation and interim presentations, autonomous and self-initiated working mode, project documentation.

421110014 SACPC – Simulation von Probabilistischen Schaltkreisen

A. Jakoby
Projekt

Veranst. SWS: 10

Beschreibung

Probabilistische Schaltkreise stellen ein Modell zur Simulation von analogen Berechnungen. In diesem Projekt sollen die unterschiedlichen Modelle von probabilistischen Schaltkreisen und deren Anwendbarkeit für analoge Berechnungen untersucht werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Programmierkenntnisse (Python)

Leistungsnachweis

Zwischen- und Abschlusspräsentation, Dokumentation

421110015 Understanding Social Investing Hype

B. Stein, N. Kolyada, M. Völske, M. Wiegmann
Projekt

Veranst. SWS: 10

Beschreibung

The last few years have seen an unprecedented boom in retail investment, driven largely by decentralized coordination

in active online communities and a new breed of easy-to-use, extremely low-barrier-to-entry investment apps. This new level of public participation both liberated the investment business and opened new markets but also created several new, large-scale economic phenomena. In this project we will analyze social media datasets with an eye to large-scale economic phenomena, and tackle research questions related to social media analysis, author profiling, computational ethics, and the interplay between social media and market sentiment. We will employ big data tools, machine learning, and natural language processing.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110016 Web Almanac revisited

B. Stein, J. Bevendorff, M. Gohsen, M. Völske
Projekt

Veranst. SWS: 10

Beschreibung

The Web Almanac (<https://almanac.httparchive.org/>) is an annual report of statistics around common design practices in the WWW which are extracted from 7.5 million web pages. With a crawl of the Web Archive at hand, we will reproduce these statistics, compare them to the Web Almanac, and validate or invalidate them with much more than 7.5 million pages. Participants of this project will learn how to handle big data with cluster computing technologies and will develop a reusable analysis pipeline for obtaining dependable statistics.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110017 What's that about? Knowledge and Argument Graphs in Voice Search

B. Stein, M. Gohsen, J. Kiesel
Projekt

Veranst. SWS: 10

Beschreibung

Teaching a computer to reason has been a dream and challenge to computer science ever since. Knowledge graphs like Wikidata---that contains the information from Wikipedia---are a major milestone in this endeavor. The automatic transformation of everyday language questions into formal query languages is yet another one. In this project we will focus on combining these methods for the domain of argument search, specifically for our argument search engine args.me and

it's Alexa-powered voice interface.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421110019 NAIS – Network Attached Insecurities

S. Lucks, J. Boßert, N. Lang

Veranst. SWS: 10

Projekt

Beschreibung

Das Internet of Things (IoT) wächst beständig und täglich kommen neue Produkte heraus. Diese bringen verschiedenste Sensoren und Kontrollmechanismen in das Haus der Kunden, welche deren Leben vereinfachen sollen. Jedoch sind diese Geräte oftmals nicht ausreichend vor dem Zugriff von Außenstehenden geschützt. In diesem Projekt sollen verschiedene IoT Produkte in dieser Hinsicht untersucht werden.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Solid programming skills

And at least one of the following:

- Introduction to Modern Cryptography
- Experience with microcontrollers

Leistungsnachweis

Zwischenpräsentation, Abschlusspräsentation, Abschlussbericht

421150038 Recent Results in Cryptographic Research

S. Lucks

Veranst. SWS: 2

Seminar

Beschreibung

In dem Seminar werden aktuelle Veröffentlichungen aus dem Feld der Kryptographie gelesen und erarbeitet. Der Schwerpunkt dieses Seminars wird im ersten Treffen bekanntgegeben.

Bemerkung

-online-

erste Veranstaltung: zu Beginn der Vorlesungsfreien Zeit

Leistungsnachweis

Vortrag und wissenschaftliche Ausarbeitung

421150039 Workshop 3P - Musical Interfaces with PSLab, Python, and Processing

H. Waldschütz, N.N., Projektbörse Fak. KuG

Veranst. SWS: 1

Workshop

Beschreibung

In this 3-day hands-on workshop we will explore the design and basic implementation of musical interfaces and sound generation with PSLab, Processing 3 and Python.

The Pocket Science Lab [1] is an open hardware device, which can be used as oscilloscope, multimeter, wave generator, logic analyzer, power source, among others. In this class we will use the PSLab as an input and output device, to generate creative/procedural algorithmic music.

At least since Brian Eno's Generative Music 1 (1996), the idea of ever changing musical compositions created by a system has been popularized. By connecting sensors to the PSLab we have the foundation for creating our own physical/tangible musical interfaces.

For example ultrasonic sensors can be used similar to a theremin, capacitive sensing can trigger touch events, and a light dependent resistor (LDR) can be controlled via a flash light.

To do so we will shed some light on basic electronics and interfacing methods, sound synthesis and Programming in Processing 3 [2] (and some Python).

This Workshop consist of three sessions (~3-4h each):

1. Introduction and overview
2. Ideas and experiments
- 3 Presentation of your Projects.

After the first two sessions, you will have some days on your own to develop your own musical interface which will be then presented in the following third session.

All dates need to be found by the group at start of the semester!

engl. Beschreibung/ Kurzkomentar

3-day hands-on workshop to explore the design and implementation of musical interfaces and sound generation with PSLab, Processing 3 and Python.

Bemerkung

Time and place: Lecture hall, HK7, 2nd half of April 2021. All dates tba

Co-Referenten: Daniel Wessolek, PhD.

Voraussetzungen

Since there are only very limited places to attend this workshop, please apply until April 7 by email to hannes.waldschuetz@uni-weimar.de with some words about you and your motivation. We will get back to you until April 9.

There will be an initial online meeting on Monday, April 12 to find possible workshop-slots within the following 3-4 Weeks.

421150040 User Centered Design in a Nutshell

E. Hornecker, L. Guth

Veranst. SWS: 1.5

Kurs

Do, Einzel, 11:00 - 12:30, Start meeting: online (attendance mandatory), 08.04.2021 - 08.04.2021

Fr, Einzel, 15:15 - 18:00, Block 1 (attendance mandatory), 16.04.2021 - 16.04.2021

Fr, Einzel, 15:15 - 18:00, Block 2 (attendance mandatory), 30.04.2021 - 30.04.2021

Fr, Einzel, 15:15 - 18:00, Block 3 (attendance mandatory), 14.05.2021 - 14.05.2021

Fr, Einzel, 15:15 - 18:00, Bauhausstraße 11 - Seminarraum 014, Block 4 (attendance mandatory), 28.05.2021 - 28.05.2021

Beschreibung

This is a concentrated 'crash course' on User-Centered Design (UCD) for those Master students who need to do the HCI bachelor-level course (as requirement for admission) and have not had the chance to attend it yet.

User Centered Design is an iterative approach to developing useful and usable products, and a core component of HCI. In this course,

we focus on the UCD process, in particular on methods and approaches used in Requirements Analysis over Prototyping to Evaluation. We will also discuss basics of Usability and User Experience.

The course consists of video lectures on the UCD process and core concepts of HCI, several practical session meetings around shorter hands-on exercises done in pairs over the course of April + May, and an individual (graded) mini-project, which is documented in a report due several weeks after the teaching phase finishes (ca. 1 week effort).

Video lectures will be provided on Moodle. Practical sessions will run as real-time meetings (online or in-person if permitted).

Note: for everyone to participate, we might need to make use of evening slots, weekends or possibly a public holiday. (details to be announced)

Voraussetzungen

This course is only open for Master students in HCI or CS4DM who have the 'Auflage' / stipulation to do the bachelor level HCI course and have not done this course yet. It can be used to fulfill the stipulation.

Please register by sending email to lisa.guth@uni-weimar.de by Tuesday 6th 7pm. Note your name, study program, and why you need to participate.

New master students who have the HCI course as requirement have priority for this. In case there are empty places, it may be possible for students from prior semesters to also use this as replacement for the HCI bachelor course.

Leistungsnachweis

practical problem-based work in pairs and individual project-based report.

4336010 Image Analysis and Object Recognition

V. Rodehorst, M. Kaisheva

Veranst. SWS: 3

Vorlesung

Di, wöch., 09:15 - 10:45, Lecture (online, recorded sessions) Moodle: <https://moodle.uni-weimar.de/course/view.php?id=30890>
(Registration will be open from March 29, 2021 onwards.), ab 06.04.2021

Do, unger. Wo, 11:00 - 12:30, Lab (online), ab 15.04.2021

Di, Einzel, 09:00 - 11:00, written exam Location: Falkenburg, 27.07.2021 - 27.07.2021

Mo, Einzel, 09:00 - 12:00, Bauhausstraße 11 - Seminarraum 015, repeat exam (written exam), 06.09.2021 - 06.09.2021

Beschreibung

Bildanalyse und Objekterkennung

Die Vorlesung gibt eine Einführung in die Grundlagen der Mustererkennung und Bildanalyse. Behandelt werden unter anderem die Bildverbesserung, lokale und morphologische Operatoren, Kantenerkennung, Bilddarstellung im

Frequenzraum, Fourier-Transformation, Hough-Transformation, Segmentierung, Skelettierung, Objektklassifizierung und maschinelles Lernen zur visuellen Objekterkennung.

engl. Beschreibung/ Kurzkomentar

Image analysis and object recognition

The lecture gives an introduction to the basic concepts of pattern recognition and image analysis. It covers topics as image enhancement, local and morphological operators, edge detection, image representation in frequency domain, Fourier transform, Hough transform, segmentation, thinning, object categorization and machine learning for visual object recognition.

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und Klausur (sowie des [Final Projects](#) für das Erreichen der 6 ECTS)

4447556 Digital Watermarking and Steganography

A. Jakoby

Veranst. SWS: 4

Vorlesung

Do, wöch., 15:15 - 16:45, Lecture (online) Moodle-Link: <https://moodle.uni-weimar.de/course/view.php?id=30969>, ab 08.04.2021
Di, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal B, Lab class Bis auf Weiteres/until further notice: online, ab 13.04.2021

Beschreibung

Digitale Wasserzeichen und Steganography

Digitale Wasserzeichen dienen dazu Nachrichten zu einer Bild-, Audio- oder Videodatei innerhalb dieser Datei selber abzulegen. Ein zentrales Ziel der hierzu verwendeten Verfahren ist es, sicherzustellen, dass die eingebetteten Informationen nicht wieder entfernt werden können. Solche Nachricht können dazu herangezogen werden, um zusätzliche Informationen über den Inhalt der Medien selbst zu liefern, so zum Beispiel bestehende Urheberrechte. Digitale Wasserzeichen sollen daher lesbarer oder zumindest nachweisbar sein. Jedoch sollen sie nur mit erheblichen Aufwand wieder zu entfernen sein.

In der Steganographie untersuchen wir Systeme, in denen die eingebetteten Informationen vollständig für Unbefugte versteckt werden soll. Selbst die Tatsache, dass eine Mediendatei eine versteckte Botschaft enthält, soll für Unbefugte nicht zu beobachten sein. Somit ist es durch Verwendung eines solchen Systems möglich, dass zwei Personen Informationen austauschen, ohne dass eine dritte Person die Kommunikation detektieren kann.

In dieser Vorlesung werden wir grundlegende Konzepte, Methoden und Anwendungen der digitalen Wasserzeichen und Steganographie vorstellen und analysieren.

engl. Beschreibung/ Kurzkomentar

Digital Watermarking and Steganography

Digital watermarking is the practice of hiding a message about an image, audio clip, video clip, or other work of media within that work itself. One goal of the used methods is to ensure that the message cannot be removed after it is embedded in the media. Thus, systems can use such a message to provide additional information of the content of the media itself, e.g. copyrights. Digital watermarks have to be readable or detectable, but they should be hard to remove from the content.

In steganography we investigate systems where the embedded information is completely hidden for unauthorized parties. Even the fact that a media file contains a hidden message should be hidden. Thus, by using such a system two parties can communicate in such a way that a third party cannot detect the communication.

In this lecture we will introduce some basic concepts, methods and applications of digital watermarking and steganography.

Voraussetzungen

BSc in a relevant study field

Leistungsnachweis

oral examination (individual appointments via Moodle)

4526501 Academic English Part One

G. Atkinson

Veranst. SWS: 2

Kurs

Di, wöch., 17:00 - 18:30, Online (Moodle) , ab 20.04.2021

Beschreibung

This is the first part of a two-part course which aims to improve your ability to express yourself clearly in written English and to develop a suitably coherent academic writing style. Part One concentrates mainly on structure in writing academic articles, essays and reports. We begin by examining the structure of individual paragraphs and move on to extended texts of various types (e.g. process essays, cause/effect, comparison/contrast, etc.). Particular attention is paid to connectives, i.e. transitional phrases and constructions which help you link ideas and paragraphs in a logical, systematic way.

The course will be conducted basically in an online correspondence format with occasional video consultations and/or face-to-face teaching sessions if and as required. The time allocated for these is Tues 17.00-18.30. The individual dates, if required, will be determined as the course progresses

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part Two and those who need to repeat Academic English Part One**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE I Registration.

Leistungsnachweis

continuous assessment

4526502 Academic English Part Two

G. Atkinson

Veranst. SWS: 2

Kurs

Mi, wöch., 17:00 - 18:30, Online (Moodle) , ab 21.04.2021

Beschreibung

Part Two of the Academic English course concentrates on improving and refining aspects of academic writing style. It includes sections on clause and sentence structure, punctuation rules and how to incorporate quotations, statistics and footnotes into academic texts.

The course will be conducted basically in an online correspondence format with occasional video consultations and/or face-to-face teaching sessions if and as required. The time allocated for these is Weds 17.00-18.30. The individual dates, if required, will be determined as the course progresses.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part One and those who need to repeat Academic English Part Two**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE II Registration.

Leistungsnachweis

continuous assessment

4555211 Algorithmen und Datenstrukturen

C. Wüthrich, F. Andreussi, Projektbörse Fak. KuG

Veranst. SWS: 4

Vorlesung

Do, wöch., 11:00 - 12:30, Vorlesung / Lecture (online) <https://moodle.uni-weimar.de/course/view.php?id=31390>, ab 15.04.2021

Fr, wöch., 11:00 - 12:30, Übung / Exercise (online), ab 23.04.2021

Fr, wöch., 15:15 - 16:45, Übung / Exercise (online), ab 23.04.2021

Do, Einzel, 10:00 - 12:00, Prüfung / exam Falkenburg / Innensporthalle, 05.08.2021 - 05.08.2021

Beschreibung

Das Lernziel dieser Veranstaltung soll zum einen der generelle Umgang und die selbstständige Entwicklung, Analyse, und Optimierung von Algorithmen und Datenstrukturen sein. Zum anderen soll ein Überblick über gängige problemspezifische Verfahren und deren Anwendung in der Praxis vermittelt werden.

engl. Beschreibung/ Kurzkomentar

Algorithms and Data Structures

The lecture deals with the principle and the implementation of basic algorithms and data structures. The course teaches among all, the Strings, geometric problems, graphs, mathematical algorithms and NP-complete problems.

Leistungsnachweis

Beleg, Klausur

4555262 Visualisierung**B. Fröhlich, N.N., J. Reibert, G. Rendle**

Veranst. SWS: 3

Vorlesung

Do, wöch., 13:30 - 15:00, Vorlesung/Lecture - taught online (live&recorded)- Moodle: <https://moodle.uni-weimar.de/course/view.php?id=31089> , ab 08.04.2021

Mo, wöch., 17:00 - 18:30, Übung /Lab class (Master) - taught online (live sessions) - , ab 12.04.2021

Di, wöch., 11:00 - 12:30, Übung (Bachelor) - taught online (live sessions)- , ab 13.04.2021

Mo, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal A, schriftl. Prüfung / written exam, 27.09.2021 - 27.09.2021

Beschreibung

Im ersten Teil der Veranstaltung werden die wichtigsten Verfahren und Techniken aus dem Bereich der Informationsvisualisierung für folgende Datentypen vorgestellt: multi-dimensionale und hierarchische Daten, Graphen, Zeitreihen und mengenbasierte Daten. Der zweite Teil beschäftigt sich mit verschiedenen Ansätzen und Algorithmen zur Visualisierung volumetrischer und vektorieller Simulations- und Messdaten. Die Veranstaltung wird englischsprachig angeboten.

In den Übungen werden eine Auswahl der in den Vorlesungen vorgestellten Visualisierungsansätze umgesetzt, getestet und evaluiert. Ein separates Abschlussprojekt wird angeboten und mit zusätzlich 1,5 ETCS angerechnet.

Bemerkung

Bitte beachten Sie:

um 6ECTS Punkte zu erhalten, ist zusätzlich der Kurs "[Visualization - Final Project](#)" verpflichtend zu belegen.**Voraussetzungen**

Programmierkenntnisse sowie gute Kenntnisse von Algorithmen und Datenstrukturen sind erforderlich, z.B. nachgewiesen durch den erfolgreichen Abschluss der entsprechenden Lehrveranstaltungen des Bachelor-Studiengangs Medieninformatik. In den Laborveranstaltungen werden JavaScript- und grundlegende GLSL-Programmierung eingesetzt. Grundkenntnisse der Computergrafik sind hilfreich, z.B. erworben durch die Vorlesung Computergrafik im Bachelor-Studiengang Medieninformatik.

Leistungsnachweis

Vorlesungsbegleitende Übungen, mündliche oder schriftliche Prüfung.

Ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1.5 ECTS.

4556105 Advanced Numerical Mathematics**K. Gürlebeck, D. Legatiuk**

Veranst. SWS: 4

Vorlesung

Mo, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2, Lecture (hybrid), ab 12.04.2021

Mo, wöch., 15:15 - 16:45, Coudraystraße 13 A - Hörsaal 2, Exercise (hybrid), ab 12.04.2021

Mo, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Seminarraum 210, written exam, 09.08.2021 - 09.08.2021

Beschreibung

Höhere Numerik

Effiziente Lösung linearer und nichtlinearer Gleichungssysteme;

- Diskretisierungsmethoden für verschiedene Typen partieller Differentialgleichungen
- Projektionsverfahren, Stabilität, Konvergenz und Konditionszahl
- Direkte Löser für schwach besetzte Systemmatrizen
- Fixpunktsatz, iterative Löser, Gesamtschrittverfahren, Einzelschrittverfahren, Gradientenverfahren, Relaxationsverfahren, Multiskalenmethoden und Überblick über andere Zugänge
- Eigenwertprobleme, iterative Löser

- Gebietszerlegungsverfahren

engl. Beschreibung/ Kurzkomentar

Advanced Numerical Mathematics

Efficient solution of linear and non-linear systems of algebraic equations;

- Discretization methods for different types of partial differential equations
- Projection methods, stability and convergence, condition number
- Direct solvers for sparse systems
- Fixed-point theorem, iterative solvers: Total step method, single step method, gradient methods, relaxation methods, multiscale methods and a survey on other approaches
- Eigenvalue problems, iterative solvers
- Domain decomposition methods

Voraussetzungen

Courses in Linear Algebra, Analysis

Leistungsnachweis

Project

4556216 Ubiquitous Computing

E. Hornecker, B. Schulte

Veranst. SWS: 4

Vorlesung

Mi, wöch., 11:00 - 12:30, Lab / first lecture (April 7th, 2021) - online - , ab 07.04.2021

Mo, wöch., 13:30 - 15:00, Lecture (online) <https://moodle.uni-weimar.de/course/view.php?id=30663>, ab 12.04.2021

Beschreibung

The course explores advanced topics in HCI, presenting and reflecting on the concerns, perspectives and interdisciplinary nature of this area. We will look at new and emerging technologies and the issues they entail. These technologies move beyond 'traditional' computing concerns, in particular by going from the desktop into the world [ubiquitous computing], moving from the workplace to the home and other settings [e.g., domestic, public spaces], from purely functional to ludic concerns [e.g. home entertainment, pervasive games], and from digital to digital-physical systems [tangible computing, IoT].

The course covers technical aspects as well as user-centered design, concept prototyping and evaluation methods relevant for Ubiquitous Computing, and a discussion of broader societal and value-related concerns (e.g. privacy, security, user agency versus ambient intelligence).

Successful students should be able to

- discuss the diverse and emergent areas within UbiComp technologies and the issues they entail
- develop concepts for UbiComp applications that are appropriate for a given use context and illustrate these (sketching, video prototyping, Wizard of Oz) as well as determine their technical feasibility
- be able to reflect on practical experiences engaging with some of these technologies from a user-centred perspective
- understand the technical functioning of example UbiComp technologies
- choose and give a rationale for appropriate user-centered design methods for example application problems

- critically assess societal implications and discuss design trade-offs of UbiComp applications.
- understand complex issues from the HCI and UbiComp research literature, in particular, to summarize literature and to discuss it

Note: This course is offered biannually (and used to be called: Advanced HCI: UbiComp)

Introductory Literature:

- Ubiquitous Computing Fundamentals. Ed. John Krumm. ISBN: 1420093606. Chapman & Hall/CRC 2009.
- Harper, Rodden, Rogers, Sellen (eds.). Being Human: Human-Computer Interaction in the Year 2020. Microsoft Research Ltd 2008

Rowland et al. Modern User Interfaces for UbiComp Systems. O'Reilly 2015 V14h1.6I0,5.7

Bemerkung

Takes place bi-annual / every 2 years

Leistungsnachweis

practical assignments, individual and in group work